50E029ZN4220 Instruction Manual

DATA INTERFACE UNIT

MP MASTER
MA29829

Scientific-Atlanta

When ordering parts from Scientific-Atlanta, Inc., be sure to include the equipment model number, equipment serial number, and a description of the part.

MODEL NO. _____

SERIAL NO. _____

DATA INTERFACE UNIT

In all correspondence concerning this publication, refer to 50E029ZN4220

Second Edition
November 1972

SCIENTIFIC-ATLANTA, INC.
P. O. Box 13654, Atlanta, Ga. 30324

L355

TABLE OF CONTENTS

Paragraph		Page
	CHAPTER 1 GENERAL INFORMATION	
1.1	GENERAL	1-1
1.2	PURPOSE OF EQUIPMENT	1-1
1.3	GENERAL DESCRIPTION	1-1
	CHAPTER 2 INSTALLATION	
2.1	GENERAL	2-1
2.2	UNPACKING AND INSPECTION	2-1
2.3	INSTALLATION	2-1
2.4	PARALLEL OPERATION OF CRYSTAL-BOLOMETER AMPLIFIER	2-2
	CHAPTER 3 OPERATION	
3.1	GENERAL	3-1
3.2	FRONT PANEL CONTROLS AND INDICATORS	3-1
	3.2.1 MODEL 1843 DIGITAL SYNCHRO DISPLAY	3-1
	3.2.2 MODEL 1831 DIGITAL LIN/LOG DISPLAY	3-1
	3.2.3 MODEL 2011 DIGITAL POSITIONER PROGRAMMER	3-3
	3.2.4 MODEL 1811 DATA DISTRIBUTION PRINTER	3-8
	3.2.5 MODEL 1882 TAPE READER	3-9
	3.2.6 MODEL 1863 TAPE RECORDER	3-10

TABLE OF CONTENTS - continued

Paragraph		Page
3.3	SYSTEM OPERATIONS	3-12
	3.3.1 DATA SOURCE	3-12
	3.3.2 DATA DESTINATION	3-15
	CHAPTER 4 THEORY OF OPERATION	
4.1	GENERAL	4-1
4.2	BCD-TO-GRAY CONVERSION	4-1
4.3	GRAY TO BCD CONVERSION	4-2
4.4	POWER SUPPLY CIRCUIT	4-3
	CHAPTER 5 MAINTENANCE	
5.1	GENERAL	5-1
5.2	VISUAL INSPECTION	5-1
5.3	CLEANING	5-2
5.4	TROUBLESHOOTING	5-2
5.5	LOGIC TROUBLESHOOTING	5-3
	5.5.1 TTL TROUBLESHOOTING	5-4
	5.5.2 DTL TROUBLESHOOTING	5-4
	5.5.3 DTL TROUBLESHOOTING HINTS	5-7
5.6	ADJUSTMENTS	5-7
	5.6.1 POWER SUPPLY ADJUSTMENT PROCEDURE	5-7
	5.6.2 RECORDER LOGIC LEVEL CONVERTER PULSE WIDTH ADJUSTMENTS	5-7

TABLE OF CONTENTS - continued

Paragraph		Page
	CHAPTER 6 PARTS LISTS	
6.1	GENERAL	6-1
6.2	EXPLANATION OF COLUMN HEADINGS	6-1
6.3	ORDERING PARTS	6-2
	CHAPTER 7 DIAGRAMS	

CHAPTER 1
GENERAL INFORMATION

1.1 GENERAL

Contained within this instruction manual is information required to properly install, operate, and maintain the Scientific-Atlanta Data Interface Unit.

1.2 PURPOSE OF EQUIPMENT

The purpose of the Data Interface Unit is to provide timing interface and code conversions. Code conversion is switch selectable. In the PUNCH mode BCD to gray code conversion takes place. In READ mode, gray code to BCD conversion is made.

The PUNCH mode is used to transfer data from the Model 1833-20 Ratiometer unit to the Model 1811 Digital Data Distribution Printer and/or the Model 1863 Recorder.

In the READ mode, data read from the Model 1882 Reader is transferred to the 1811 Data Distribution Printer, or to the 1863 Tape Tape Recorder for tape duplication.

The READ or PUNCH modes are selected by a front panel toggle switch.

In the PUNCH mode, system timing is supplied by the Model 2011 Digital Positioner Programmer. In the READ mode, timing is supplied by the Model 1882 Reader.

1.3 GENERAL DESCRIPTION

The Scientific-Atlanta Data Interface unit provides the necessary interface to allow the following Scientific-Atlanta instruments to operate as a system.

Model 2011 Digital Positioner Programmer
Model 1833 Ratiometer
Model 1811 Data Distribution Printer
Model 1863 Tape Recorder (punch)
Model 1882 Tape Reader (reader)

Operating instructions for these instruments will be found in their respective instruction manuals.

Specifically, the binary code converter allows the following operations:

1. BCD data from the Model 1833 Ratiometer to be either or both:
   a. Printed on the Model 1811 Data Distribution Printer.
   b. Connected to gray code and punched on the Model 1863 Tape Recorder punch.
2. Gray code data from the Model 1882 Tape Reader to be either or both:
   a. Connected to BCD and printed on the Model 1811 Data Distribution Printer.
   b. Punched on the Model Tape Recorder punch for tape duplication.

CHAPTER 2
INSTALLATION

2.1 GENERAL

The Data Interface Unit is supplied by Scientific-Atlanta for use in a system which may be mounted in a centralized operating console. For cabling information refer to the system interconnection drawing, Figure 1.

2.2 UNPACKING AND INSPECTION

When received, carefully unpack the shipping carton, inspecting for evidence of shipping damage. If damage is apparent, contact the carrier and the nearest Scientific-Atlanta representative immediately. Save the packing materials and shipping papers for inspection by the carrier's representative. Do not return the instrument to the manufacturer without receiving specific return shipment instructions.

The shipping carton may be used for storage or further transport of the unit.

Regardless of the method of mounting or shipping, save any packing and all shipping papers until satisfactory operation of the equipment is obtained.

2.3 INSTALLATION

Connect the cables as shown in Figure 1. Disconnect any other cables that are not associated with system.

CHAPTER 3
OPERATION

3.1 GENERAL

This chapter contains instructions necessary to operate the binary code converter. Brief descriptions of those digital instruments associated with the code converter are given. More detailed operating instructions will be found in their respective instruction manuals.

3.2 FRONT PANEL CONTROLS AND INDICATORS

3.2.1 SERIES 1840 DIGITAL SYNCHRO DISPLAY

POWER Switch	Applies primary power to the power transformer. The Nixie® indicators should indicate the synchro transmitter shaft angle, when power is applied.
RANGE Switch	Selects the readout range -- 0 to 360° or ±180°.
TRIGGER Switch	Selects the source for display update triggers.
OFFSET Switches	Allow the readout to be adjusted to any desired initial value between 0° and 360° or ±180°.

3.2.2 MODEL 1833 RATIOMETER

POWER Switch	Applies primary power to the power transformer. The Nixie® readout devices should illuminate.
ATTENUATION dB Switch	This switch allows coarse gain control in 10-dB increments.
GAIN Control	Provides continuous gain control over the 10-dB increments selected above.

® = Trademark registered by Burroughs Company.

CALIBRATE Switch	Reduces the input signal to the amplifier to zero when depressed. The DISPLAY RANGE Switch should be set to the 100% position. Adjust the GAIN control for a zero readout.
BOLO-XTAL Switch	Selects the proper matching circuitry for operation with a bolometer or crystal detector. In the BOLO position, bolometer bias is supplied to the bolometer.
INPUT BNC Connector	This connector is in parallel with J2 on the rear panel.
DISPLAY RANGE Switch	Selects 10- or 40-dB for a SQ LAW DET (square-law detector), or 100% operating ranges.
OUT-OF-RANGE Indicator	Illuminates when the input signal is beyond the range extremes selected by the DISPLAY RANGE switch. The ATTENUATOR or GAIN controls can be readjusted if the signal is too large. If the signal is too low, set the DISPLAY RANGE switch to the 40- or 80-dB positions.
DATA Indicator	Illuminates while the indicator reading is valid, extinguishes during the reading and settling time.
TRIGGER Switch	Selects the source for read triggers.
PERIOD SECONDS Switch	Selects the length of time required for making a measurement. For low-level noisy signals, longer measurement times produce a filter action due to averaging over a longer time with a reduction in readout variation.
LINEAR ZERO	Provides indicator zeroing capability when the DISPLAY RANGE switch is set to 100% range.

3.2.3 MODEL 2011 DIGITAL POSITIONER PROGRAMMER

Control	Description
1st SCAN REV/FWD Switch	Used with the 2nd SCAN RETRACE/ REV/FWD switch to set up the scan pattern.
2nd SCAN RETRACE/REV/FWD Switch	See above.
REVERSE LIMIT Switch	This digital thumbwheel switch is used to set up the recording limit in the reverse (decreasing angle) direction.
FORWARD LIMIT Switch	This digital thumbwheel switch is used to set up the recording limit in the forward (increasing angle) direction.
REVERSE Lamp	When lit, indicates that the scan control logic has selected the reverse scan direction.
FORWARD Lamp	When lit, indicates that the scan control logic has selected the forward scan direction.
RECORD INCREMENT Switch	Selects the angular interval at which record pulses are generated.
PRINT INCREMENT MULTIPLIER Switch	Selects the angular interval at which print pulses are generated, in multiples of the record increments, or disables print pulses.
(Increment) ON/OFF Switch	In the ON position, this switch enables the RECORD INCREMENT switch and PRINT INCREMENT switch and disables the TEST switch. When placed to OFF, it disables the RECORD and PRINT INCREMENT switches and enables the TEST switch.

Control	Description
TEST Switch	When pressed, this switch generates one record pulse and one print pulse. It will not generate a print pulse if the PRINT INCREMENT switch is set to OFF.
OVERSPEED Indicator	Becomes illuminated and remains illuminated when either a print pulse is generated while the printer is busy, or a record pulse is generated while the recording equipment is busy.
RECORD DUTY CYCLE Meter	Indicates the percentage of the time that the recording or printing system is busy. The meter indicates whichever system duty cycle is higher.
RESET Switch	Clears the overspeed circuits and turns off the OVERSPEED indicator.
RUN Switch and Indicator	Starts program operation from the stop mode or restarts program operation from the pause mode. The RUN switch also clears a pause request.
PAUSE Switch and Indicator	Requests a pause at the next available time. When a pause request has been entered, the lamp flashes on and off until it is answered. A pause request can be answered at any time the scan axis reaches a limit or when the step axis completes a step. A pause request, when answered, causes the program to hold where it is with the full capability of continuing. To continue the program, press the RUN pushbutton switch.

Control	Description
STOP Switch	Pressing the STOP switch causes the program to stop immediately and resets the program to the beginning conditions. The program cannot be continued from this condition, but a new program can be begun. To begin a program, press the RUN pushbutton switch.
MODE Switch	This five-position rotary switch selects the operating mode of the programmer. The five positions are MANUAL, SINGLE SCAN, SINGLE STEP, AUTO, or AUTO EXT.
MANUAL Position	This switch position locks the programmer in the stop condition. All output relays are forced to the manual position. The manual condition for each output relay may be independently defined.
SINGLE SCAN Position	In this position, pressing the RUN pushbutton causes the programmer to make the first scan and return to the stop condition. If the RETRACE position of the 2nd SCAN-RETRACE switch is selected, the programmer will scan, retrace, and stop. A single scan will be executed each time the RUN pushbutton is pressed.
SINGLE STEP Position	When this position is selected, pressing the RUN pushbutton will cause the programmer to make one step and return to stop.

AUTO Position

Pressing the RUN pushbutton when the MODE switch is in the AUTO position causes the programmer to execute the complete program, then stop.

AUTO EXT Position

This position functions exactly as does the AUTO position except that the external pause, stop, and single cycle control lines are allowed to control the programmer functions.

These lines are:

Pause Line: When held low, provides the same function as pressing and holding the PAUSE pushbutton switch. When this line makes a low-to-high transition, any pause condition is cleared.

Stop Line: A logic low on this line causes the program to stop immediately just as though the STOP pushbutton switch had been pressed. The programmer remains locked in stop and cannot be restarted as long as AUTO EXT is selected and the stop line is low.

Single cycle line: This line, when held low, causes a pause request to be entered when the step axis is selected and a pause to occur just prior to the start of the next data scan. A low-to-high transition clears any pause condition unless pause line is low at the time of transition.

RECORD Indicator

When illuminated, the RECORD indicator shows when record pulses are being generated. The lamp

	lights, but no pulses are generated if the INCREMENT ON/OFF switch is in the OFF position.
RETRACE Indicator	Illuminated, this lamp indicates when scan control logic has selected retrace ("move scan axis, but do not take data") or has detected a limit overshoot condition which requires the logic to move the scan axis without taking data.
STEP Indicator	The STEP indicator lamp shows that the step axis is selected by the control logic.
NUMBER OF SCANS Switch	This digital thumbwheel switch sets the number of data collection scans to be included in the program.
STEP REV/FWD Switch	The drive direction of the step axis is selected with this switch. FWD is an increasing angle, REV is a decreasing angle.
STEP SIZE Switch	The size of each step is selected by this switch. Seven step sizes are available from 0.1 to 10 degrees.
PRINT STEP SIZE MULTIPLIER Switch	This switch causes the data distribution printer to print only the selected multiple step size.
POWER Switch	AC line power is applied and removed with this switch. The programmer automatically resets to the stop mode when power is applied.

3.2.4 MODEL 1811 DATA DISTRIBUTION PRINTER

Control	Description
POWER Indicator	When lit, indicates that ac power is applied and the POWER switch is either in the STANDBY or ON position.
STANDBY/ON SWITCH	When in the down position, the unit is off and all internal dc voltages are disabled. STANDBY position; all internal voltages except the +48 volts required to operate the solenoids in the output writer are enabled. The output writer will not operate but all internal circuit flags operate as normal. ON position; all voltages are enabled and the unit is ready for operation.
Carriage Return AUTO	When this switch is in the AUTO position, the carriage will automatically return when the margin is reached. If not in the AUTO position, it is necessary for the carriage return signal to be input from an exteranl source; such as the system computer.
OVERSPEED Indicator	When depressed clears overspeed interlock and extinguishes OVERSPEED indicator.
TEST Switch	Allows the manual single-step operation of the output writer. It's used primarily for test and adjustment purposes of the output writer. When depressed, whatever data is currently being applied to connector J3 will be printed.
40 dB LIMIT Switch	When in the up position, all values input to the 1811 more negative than -40 dB will not be printed. A minus sign will be printed instead. When in the OFF position, chart "folding" is allowed. That is, values greater than -40 dB will be printed with the most significant digit removed, -41 will be printed as 1, -42 will be printed as 2, etc.

RESOLUTION, dB	
±0.5	In the ±0.5 dB position, input data will be rounded to the nearest whole number and printed.*
±0.2	In the ±0.2 dB position, input data within plus or minus 0.2 dB of a whole number is rounded to that number and printed. Otherwise, the output writer is caused to space.**
CONTOUR INTERVAL, dB	Allows selection of values to be printed on the output writer for purposes of creating contours for visual effects.
1	All values input to the 1811 will be printed on the output writer.
2	Values of increments of 2 dB will be printed on the output writer, ie., 0, 2, 4, 6 etc. Other values will cause the output writer to space.

3.2.5 MODEL 1882 TAPE READER

Control	Description
POWER Switch	Controls application of ac power to the tape reader and the direction in which the tape is fed through the reader. The indicator lamp near the Power switch indicates when ac power is applied. In the STANDBY position, bistable circuits are placed in their proper initial state. The tape reader is placed in operation by turning the POWER switch to the FORWARD or REVERSE position. In the FORWARD position, tape is fed through the reader from left to right, and the data are read in the same sequence as recorded by the Model 1863 Tape Recorder. The drive motors for the tape reader mechanism and takeup reel are turned off when the POWER switch is in the STANDBY position. To prevent needless wear of the tape reader and to eliminate the noise produced by the reader mechanism, the POWER switch should be left in the OFF or STANDBY position when the reader is not in use.
FEED Pushbutton	Causes the paper tape to be fed through the reader in the direction determined by the POWER switch. The tape code is not read when feeding tape.

*For input values of +0.3 and +0.4 a space is output, above +0.4 a + sign is printed.

**For input values above +0.5 dB, a + sign is printed.

Control	Description
START Pushbutton	Initiates the reading of the paper tape.
STOP Pushbutton	Terminates the reading of the paper tape
AUTO STOP Switch	Causes the tape reader to stop when a data marker is read when in the START SCAN or END FILE position. When in the OFF position, the tape is fed through the reader until the STOP pushbutton is pressed, or until the tape supply is exhausted. The code read immediately after pressing the pushbutton will be the character following the data marker.
READ RATE Switch	Synchronizes the reader to an external trigger or an internal clock. When in the EXT position, the reader is synchronized with triggers applied to J3 (located on the connector panel at the rear of the reader). The internal clock is synchronized to sub-multiples of the reader synchronous speed, which is 50 cycles per second.

3.2.6 MODEL 1863 TAPE RECORDER

Control	Description
POWER switch	Controls application of ac power to the tape recorder. In the STANDBY position, bistable circuits are placed in their proper initial state. The tape recorder is placed in operation by turning the POWER switch to the PUNCH ONLY or PUNCH & TYPE position. The clear indicator lamp near the POWER switch indicates when ac power is applied. The drive motors for the tape punch and tape take-up reel are turned off when the POWER switch is in the STANDBY position. To prevent needless wear on the tape punch and to eliminate the noise produced by the punch mechanism, leave the POWER switch in the OFF or STANDBY positions when not recording data. The punch-only mode is employed when operating at speeds greater than approximately 15 characters per second, and with the typewriter turned off.

Control	Description
CODE LEVEL Switch	Determines the code level, or number of binary bits recorded, and determines whether the code offset is subtracted from the input data. (The 7-level and 8-level codes can be recorded only when the tape recorder is employed with a Model 1803 Radiation Distribution Printer). When the CODE LEVEL switch is in one of the 1/2 dB OFFSET positions, the subtraction circuit is disabled and the recorded code is offset 1/2 dB from the chart reading of the antenna pattern recorder. When in one of the ZERO OFFSET positions, the subtraction circuit is placed in operation and 1/2 decibel is subtracted from the coded input. The 1/2 dB Offset mode is employed when duplicate tapes or radiation distribution charts are to be made employing the Model 1882 Tape Reader. If the tape recording is to be made specifically for entry into a computer for data processing, the zero offset mode will usually be preferred.
FEED Pushbutton	Controls the feeding of leader strips of tape. No data holes are punched while feeding.
DELETE Pushbutton	Causes the delete code to be punched. The delete code consists of holes punched in tracks 1 through 7 when recording 6-level, 7-level, or 8-level codes*. A character can be over-punched with the delete code to prevent that character from being read by the Model 1882 Tape Reader or by a computer.
START SCAN Pushbutton	Causes a start-of-scan data marker to be recorded on the tape. The start-of-scan code consists of holes punched in tracks 5 and 6. A bistable memory circuit prevents the recording of two consecutive start-of-scan markers.*
END FILE Pushbutton	Causes an end-of-file data marker to be recorded.* The end-of-file code consists of holes punched in tracks 4, 5, and 6. A bistable memory circuit prevents the consecutive recording of two end-of-file markers.

*See Paragraph 3.6 Model 1863 instruction manual.

Control	Description
READY Lamp	This lamp is illuminated after the START SCAN pushbutton has been pressed and indicates that the system is ready to record data. Data cannot be recorded unless the READY light is illuminated.

3.3 SYSTEM OPERATIONS

Paragraphs 3.3.1 through 3.3.1.7 illustrate operation in the punch and/or type mode. Paragraphs 3.3.2 through 3.3.2.4 illustrate operation in the read and type mode.

3.3.1 PUNCH AND/OR TYPE MODE

This mode allows data from the lin/log display unit to be read, under command from the programmer, and punched on the tape recorder and/or printed on the data distribution printer (DDP).

3.3.1.1 Model 1841 Digital Synchro Display Unit Adjustments

a. Set POWER switch to ON.

b. Set RANGE switch to 0-360 degrees. This is necessary for proper operation of the Model 2011 Digital Positioner Programmer.

c. Set TRIGGER switch to INT (internal trigger allows the device to update the digital display and BCD output at a 100-Hz rate).

d. Position OFFSET switches as desired.

3.3.1.2 Model 1831 Digital Lin/Log Display Unit Adjustments

a. Set POWER switch to ON.

b. Set TRIGGER switch to EXT (external trigger). This allows the device to be triggered by the 2011 Digital Positioner Programmer at each recording increment.

c. Set PERIOD SECONDS switch to .01 seconds. Other settings may be used at decreased recording speeds.

d. Set BOLO-XTAL switch to BOLO. Adjust bolo bias to 6 mA (for use with Series 1600 Receiver).

e. Set DISPLAY RANGE to 40 dB (for operation with Series 1600 Receiver because the receiver has a 40 dB display range).

3.3.1.3 Model 2011 Digital Positioner Programmer Adjustments

There are several ways to use the digital positioner programmer for programmed scan of antenna patterns.

The following example will assume a recording to be made between the scan angles of 10 to 40 degrees at 1-degree increments. The starting step angle will be 45 degrees, with increments of 1-degree. Two scan lines will be recorded. The digital positioner programmer will be adjusted to cause the positioner to move in the forward direction from 10 to 40 degrees, initiate recording of data at these angles and at each 1 degree interval between, retrace at the completion of the first scan line, scan the second line and halt.

Before making the following adjustments, manually adjust the antenna for a step angle of 45 degrees. Adjust the scan angle to 9 degrees.

a. Set POWER switch to ON.

b. Set 010 into the REVERSE LIMIT thumbwheel switch. This determines the end of scan angle, or the angle at which the last data point will be taken.

c. Set 040 into the FORWARD LIMIT thumbwheel switch. This determines the end of scan angle, or the angle at which the last data point will be taken.

d. Set 1st SCAN switch to FWD. This will cause the positioner to move in the direction of increasing angles, that is from 9 degrees toward the starting angle of 10 degrees.

e. Set RETRACE switch to RETRACE. This will cause the positioner to retrace after completion of each scan cut. No data will be recorded during retrace.

f. Set RECORD INCREMENT to 1. This cause data to be taken at 1-degree increments.

g. Set PRINT INCREMENT MULTIPLIER to 1.

h. Set ON/OFF/TEST switch to ON. This switch enables the programmer to record.

j. Set NUMBER OF SCANS to 02.

k. Set STEP REV/FWD switch to FWD.

l. Set STEP SIZE switch to 1.0.

m. Set PRINT STEP SIZE MULTIPLIER to OFF.

The Model 2011 Digital Positioner Programmer is now ready for operation. Do not depress RUN at this point.

3.3.1.4 Model 1811 Data Distribution Printer

a. Set POWER to ON
b. Set carriage return to AUTO
c. Set 40 dB UNIT switch up or down as desired.
d. Set RESOLUTION switch to either ±0.5 or ±0.2 dB.
e. Set CONTOUR INTERVAL switch to desired value, 1 or 2.
f. Make sure Model B output writer is ON. The power switch is located under right front of typewriter.
g. The DDP instruction manual should be consulted for typewriter margin adjustments, impression setting, ribbon adjustments and chart alignment.

3.3.1.5 Model 1863 Tape Recorder

a. Set POWER switch to PUNCH & TYPE
b. Set CODE LEVEL to 8-level, 1/2 dB offset, 8 level.

3.3.1.6 Data Interface Unit

a. Set POWER switch to ON
b. Set data destinator to PUNCH and/or PRINT
c. If system is to punch and type, all controls are properly set.

3.3.1.7 Recording

a. Depress START SCAN on Model 1863 Tape Recorder.
b. Depress RUN on the Model 2011 Digital Positioner Programmer
c. The system will now operate automatically until the end of the Model 2011 Digital Positioner Programmer program.
d. When the Model 2011 Digital Positioner Programmer STOP light illuminates, the program is complete.
e. Depress END of FILE punch button on the Model 1863 Tape Recorder.

3.3.2 READ AND TYPE MODE

This allows data from the 1882 Tape Reader to be printed on the 1811 Data Distribution Printer.

3.3.2.1 Model 1811 Data Distribution Printer

a. Set POWER to ON.
b. Set carriage return to AUTO.
c. Set 40 dB UNIT switch up or down as desired.
d. Set RESOLUTION switch to either ±0.5 or ±0.2 dB.
e. Set CONTOUR INTERVAL switch to desired values, 1 or 2.

f. Make sure Model B output writer is ON. The power switch is located under right front of typewriter.

g. The DDP instruction manual should be consulted for typewriter margin adjustments, impression setting, ribbon adjustments and chart alignment.

3.3.2.2 Model 1882 Tape Reader

a. Position tape to be read into reader station. Position tape leader such that the first data to be read is not over or ahead of the reader station.

b. Set POWER switch to FORWARD.

c. Set READ RATE switch to 6.3.

d. Set AUTO STOP to START SCAN position.

e. Set READER OUTPUT to PUNCH & TYPE.

3.3.2.3 Data Interface Unit

a. Set POWER switch to ON.

b. Set data source selector to READER.

c. Set data destinator to PUNCH and/or PRINT.

3.3.2.4 Recording

a. Set 1811 to STANDBY.

b. Depress START push button on model 1882 Tape Reader.

c. The reader will now move the tape until the first start of scan marker is encountered and then stop. When this occurs proceed to step 3.3.2.4.-d.

d. Place 1811 power switch to ON.

e. Set 1882 Tape Reader AUTO STOP to END FILE.

f. Depress 1882 Tape Reader START push button.

CHAPTER 4
THEORY OF OPERATION

4.1 GENERAL

A detailed description of the Data Interface Unit is given in this chapter.

4.2 BCD-TO-GRAY CONVERSION

BCD information is received from the Model 1831 Digital Lin/Log Display unit through rear panel connector J9. This data is passed to the logic module, (see Figure 2) at Pins 26 through 36. Data gating, or steering, allows the BCD information to be transferred to the data distribution printer without alteration, or to be converted to Gray code for driving the Model 1863 Tape Recorder.

BCD data is inverted by U27 and U28 (on logic module) and applied to the BCD to binary converter section. Integrated circuits U18, U6B, U12A, U26C, U13A, and U13B encode the fractional portion of the BCD data word in the following manner:

BCD Value	ENCODED Binary Value
.0 dB	.00
.1	.00
.2	.25
.3	.25
.4	.25
.5	.50
.6	.50
.7	.50
.8	.75
.9	.75

This necessary round off must be accomplished before conversion to the Gray code. Normally, when the tape recorder is used with the encoders associated with the radiation distribution printers, these fractional dB values are supplied by the encoder.

The whole part of the BCD data word is converted to binary by BCD to binary encoder logic circuits U16 and U17. The resultant binary word is converted to the Gray code by logic circuits U14A, U14B, U14C and U15. Inverters U5A, U5B, U5C, U5D, U4A, U4B, U3A and U3B drives the recorder logic level converter (see Figure 3).

The recorder logic level converter translates the DTL logic levels to -24V for driving the tape recorder. The trigger and end of scan signals are shaped with monostable multivibrators on the recorder logic level converter.

Gray code data, and trigger commands, are transferred to the tape recorder from J1 of the binary code converter. End of scan signals are output through J3.

The tape recorder/reader systems have no facilities for handling signed numbers. This presents no problem if levels are normalized, by signal level adjustment to 0 dB, on the peak of the beam. Those levels from the 1831 Lin/Log Display Unit above 0 dB are positive. Such levels are printed as + on the DDP. In order to give a capability of recording these levels on the punch, 20 dB will be added to each positive level before outputting to the punch. Since positive values will be very near 0 dB, this will allow the positive dB values to be distinguishable by examination when the punched tape is read and output to the 1811 DDP.

The 1882 Reader has no capabilities of reading dB values more negative than 40 dB. Such values, read from the 1831, have 40 dB subtracted before being output to the punch. When these values are then passed through the reader and output to the 1811, the values will be printed less 40 dB.

4.3 GRAY TO BCD CONVERSION

Gray code data and trigger pulses are received from the reader at J6. Start of scan signals, to be used for carriage return commands for the data distribution printer, are received through J7.

Gray code data is stored in the storage register (see Figure 7).

The reader logic level converter translates the Gray code information in the storage register, trigger pulses, and start of scan signals to DTL-compatible levels (Figure 6).

Gray code data is passed to the logic module (see Figure 2) at Pins 39 through 50. Trigger pulses enter at Pin 38 and start of scan at Pin 37. Integrated circuits U6A, U6B, U6C, U6D, U6E, U6F, U7A, and U7B invert the Gray code. U9A, U9B, U9C, U9D, U10A, and U10B convert the Gray code to binary. The fractional portion of the binary data word is converted to BCD in the following manner:

Recorder	BCD
.00 dB	.0 dB
.25	.2
.50	.5
.75	.8

The whole part of the binary data word is converted to BCD by U31. U31 is a binary-to-BCD converter.

The resultant BCD word is then available for gating to the Model 1811 Data Distribution input.

4.4 POWER SUPPLY CIRCUIT

Four power supply voltages are required; -24, -12, +5 and +12 Volt (see Figure 4).

The -12 and +12 are provided from a single module (see Figure 5). Minus 12 volts is adjusted by R17 and monitored between common and TP2. Plus 12 volts is adjusted by R14 and monitored between common and TP1.

Minus 24 volts is supplied from transformer T2 and associated diodes and capacitor.

Plus 5 volts is obtained from transformer T1 and regulator circuits which includes transistors Q1 and Q2, and chassis-mounted transistor Q3.

CHAPTER 5
MAINTENANCE

5.1 GENERAL

Due to proven circuit designs and use of highly reliable components, maintenance of the Data Interface Unit is largely limited to regular cleaning and inspection to prevent malfunction. Discus- Discussions relative to semiconductor maintenance and instrument and logic circuit troubleshooting are also included should malfunctions occur.

5.2 VISUAL INSPECTION

WARNING

HAZARDOUS VOLTAGE LEVELS EXIST WITH THE INSTRUMENT EVEN AFTER AC POWER IS SWITCHED OFF. PERSONNEL ARE ADVISED TO EXERCISE DUE CAUTION TO PREVENT PERSONAL INJURY WHILE PERFORMING THE FOLLOWING STEPS.

a. With all ac power removed from the unit, remove the top and bottom access covers from the unit.
b. Inspect all wiring and cables for frayed, loose, or burned wires. Inspect for broken wire-wrap terminal connections.
c. Check cable connections, making sure the plugs are free from corrosion and are properly secured.
d. Check all components for evidence of overheating, breakage, vibration damage, corrosion, or loose connections.
e. Check all capacitors and transformers for leaks, bulges, etc. (as appropriate).

5.3 CLEANING

The following procedure should be followed when cleaning the instrument during the course of maintenance operations:

a. Using a clean, lint-free cloth lightly moistened with an approved cleaning solvent, remove foreign matter from the case and front panel of the instrument. Wipe dry using a clean, dry, lint-free cloth.
b. Using a hand-controlled dry-air jet (not more than 15 lbf/in^2), blow the dust from inaccessible areas.
c. Clean the electrical contacts of the connectors with a burnishing tool and/or cloth lightly moistened with an approved contact cleaner.
d. Clean the internal receptacles and printed circuit board contact "fingers" with a hand-controlled dry air jet (not more than 15 lbf/in^2), and a clean,lint-free cloth lightly moistened with an approved cleaning solvent. Wipe dry with a clean, dry, lint-free cloth.

5.4 TROUBLESHOOTING

A general knowledge of the theory of operation and of the operating procedures (Chapter 3 and 4) is required for efficient trouble-shooting of the instrument. The following procedure is recommended for general troubleshooting:

WARNING

HAZARDOUS VOLTAGES MAY BE EXPOSED DURING TROUBLESHOOTING OF THE INSTRUMENT. PERSONNEL ARE ADVISED TO EXERCISE DUE CAUTION TO PREVENT PERSONAL INJURY.

CAUTION

Remove ac power from the instrument before attempting to remove or insert printed circuit boards as damage to the components may result. Avoid dropping metallic objects into the circuitry. Exercise care in attaching test probes.

a. Determine that a binary code converter unit trouble actually exists. Check for faulty operation of related equipment. Try to operate the converter in the affected mode of operation.
b. Isolate the portion of the instrument that is not functioning properly through simple operating and electrical tests and deductive reasoning.
c. Pinpoint the faulty component or part (or circuit board if spares are readily available) and replace it.
e. Prior to reapplying ac power, attempt to determine the reason the part or component failed. In many cases, the failure may be attributable to a non-specific fault such as non-recurring transients from related equipment. If possible, correct the cause of the failure. Initiate operation of the instrument, observing carefully for signs of failure.
f. Thoroughly test the instrument and its operation with related equipment. Perform any necessary adjustments and return the instrument to normal operation.

5.5 LOGIC TROUBLESHOOTING

Troubleshooting procedures for transistor-transistor logic (TTL) and diode-transistor logic (DTL) are discussed in this chapter. The TTL family does not lend itself to troubleshooting very easily in that only one basic type of input may be used to examine circuit operations, in addition to normal inputs. The DTL family,

however, lends itself to test signal injection and a great deal of testing can be done in the circuit with an oscilloscope and a few resistors.

5.5.1 TTL TROUBLESHOOTING

The most useful troubleshooting tool for TTL is ordinary examination of circuit behavior. Since TTL can respond to pulses narrower than 20 nanoseconds, it is important that an oscilloscope be used to examine circuit operations. The oscilloscope must have a bandwidth of at least 50 MHz, preferably 100 MHz or more. A sampling-type oscilloscope is not suitable since the waveforms appearing may not be repetitive. Due to the high frequency characteristics of TTL, care must be exercised not to change circuit operation by adding excessively long leads, etc., when making test connections. A second technique which can be used for TTL is to momentarily short-circuit an output ground. All TTL circuits examined are specified to withstand a short-circuit to ground in excess of 1 second provided only one output per chip is shorted to ground at a time. This rule of a one-second limit and one output per chip is a good rule to follow on any integrated circuit but was specifically derived for examination of the characteristics of the 7400 Series TTL logic circuits, as well as many other TTL families.

The 7400 Series is typical of a TTL logic family and the following voltages apply directly to the 7400 Series, but are an excellent guide for all TTL using 5-volts VCC. Any voltage between +2.4 and +5 volts is considered a valid logic "one", while any voltage below .4 volts is considered a valid logic "zero". Typically, a logic "one" falls between +3 and +4 volts, while a logic "zero" falls between +0.2 and +0.3 volts.

5.5.2 DTL TROUBLESHOOTING

DTL is easier to troubleshoot since it has passive pull-up devices on

the outputs of the various stages, which allow "loading" by resistors to ground and indefinite duration short-circuits to ground. DTL gates do exist with active pull-ups. For these gates, the one second, one output rule must be obeyed. Therefore, if it is unknown whether the output is active pullup or passive pullup for a given gate, it is best to obey the one second, one output rule. Flip-flops can also cause problems, since shorting the output of a flip-flop may cause it to change state or may feed back to the input through internal feedback paths and change the characteristics of the flip-flops, thus generating misleading results. The susceptibility of flip-flops to this kind of problem can only be determined by examination of the manufacturer's data sheet. Any flip-flop which can be collector "OR'ed" may have its output short-circuited to ground without producing effects not shown by the logic diagram. Since it is often possible to do so, it is desirable to determine what the mode of failure is in order to determine which integrated circuits failed, so that only one need be removed from the circuit board. If wire-wrap or other replaceable integrated circuit techniques are used, these tests need not be performed in great detail since once a gate is even strongly suspected it may be easily checked by replacing it.

5.5.2.1 Input Diode Open. To check for an open input diode first note that the input appears normal. Adjust the other inputs to logic "high" and "low", watching the output of the gate. If the output does not vary, it is still possible that the output has failed. To check for output failure, adjust the inputs to give another input control and cause the other input to go from logic "one" to logic "zero" while observing the output. If the output still does not change, then the problem probably lies in the output area.

5.5.2.2 Input Diode Short-Circuit. To check for a short-circuited input diode, observe that the input voltage varies between approximately ground and +2 volts when being driven in the normal manner. This problem could still be caused by the driving output stage having a failure. To check for input diode short-circuits, connect a 6.8K resistor between VCC and the suspected input with the driving output

in the "high" state. If this resistor pulls the line "high", that is, to very nearly +5 volts then the driving output is defective. If the line remains at approximately 2 to 3 volts, the input diode is probably short-circuited.

5.5.2.3 Output Transistor Open. Adjust the inputs to cause the output transistors to pull down ("low"). If the output does not drop to the required logic "low" level, connect a 1K resistor from the output to ground. This should pull the output nearly to ground, at least down to 2 volts. If this occurs, the output transistor is open. If this does not occur, a condition may exist in which the output is being held high by force such as a short to VCC.

5 5.2.4 Output Transistor Short-Circuited. Adjust the inputs for a high output. If the output is "low", attach a 6.8K resistor to VCC from the output. This should pull the output "high", that is, to nearly +4 volts. If the output remains low, check to be sure the output is not at absolute ground but is at least 100 millivolts off ground. If the output is at absolute ground, the probable cause is a short-circuit through solder or PC material directly to ground. If the output is 100 millivolts above ground, final confirmation can frequently be accomplished by isolating the output by complete removal of solder from the connection at the lead of the integrated circuit of concern. After solder removal, it is necessary to check continuity with a ohmmeter to ensure that the circuit is open.

5.5.2.5 Input to Output Short-Circuit. A common but often difficult to locate mode of failure is an input to output short-circuit on an inverting-type gate. This can be detected by noting that the input and output move together between ground and approximately 1.5 to 2 volts. This type of symptom can propagate through many levels of gating, so care must be exercised when troubleshooting for this type of failure.

5.5.3 DTL TROUBLESHOOTING HINTS

As always, it is important to check power supply and ground connections at the chip pins. This is doubly important if the chip only pulls down to approximately 1.5 volts and, for a logic "high", swings all the way up to VCC. Such a condition occurs when a ground connection is open on a given integrated circuit.

For DTL, the acceptable logic levels based on the 930 Series are 0 to +0.5 volts for a logic "low", and +2.5 to +5 volts for logic "high". Typical DTL levels are approximately 0.3 volts for a logic "low" and full VCC for a logic "high".

Certainly the quickest troubleshooting procedure is to examine the circuit for normal operation, observe what inputs are occurring on a gate, observe what output they generate, and noting whether this output is correct for the particular inputs supplied. When it is desirable to generate test inputs, a logic "low" may be generated by short-circuiting various logic levels to ground, obeying the one output, one second rule. Caution must be observed to avoid short-circuiting any logic line to +5 volts directly, as this may cause damage to the output stage connected to that line.

5.6 ADJUSTMENTS

5.6.1 POWER SUPPLY ADJUSTMENT PROCEDURE

Only the ±12V supplies require adjustment; the -24V and +5V supplies are fixed.

On the ±12V supply, R17 adjusts the minus 12-volt level. Monitor the output voltage between common (+) and TP2 (-). The plus 12-volt supply is adjusted by R14: it may be monitored between common (-) and TP1 (+).

5.6.2 RECORDER LOGIC LEVEL CONVERTER PULSE WIDTH ADJUSTMENTS

Pulse width at Q11 should be approximately 250ms and is adjusted

by R53. Pulse width at Q14 should be approximately 30ms and is adjusted by R52. These pulses may be observed during punch operations.

CHAPTER 6
PARTS LISTS

6.1 GENERAL

The parts lists for the Data Interface Unit is included in this chapter. Changes, if any, are described at the front of this manual.

6.2 EXPLANATION OF COLUMN HEADINGS

COMP DESIG

This column contains the assigned reference designation. The reference designation appears on the referenced figure.

S-A PART NO.

The Scientific-Atlanta part number is listed in this column.

DESCRIPTION

A brief electrical and/or mechanical description of the component is contained in this column. Abbreviations used are given at the end of this chapter.

FSCM

The manufacturer's Federal Supply Code for Manufacturers codes are entered here. The code numbers are from the Federal Supply Code for Manufacturers Cataloging Handbooks H4-1 (Name to Code) and H4-2 (Code to Name) effective on the publication date of this manual. Alphabetical codes have been arbitrarily assigned to suppliers not appearing in the H4 handbooks. Identifying codes are cross-referenced (code to name) at the end of this chapter.

Mfr. Part No.

The number assigned to the part by the manufacturer is listed in this column.

6.3 ORDERING PARTS

When ordering parts from Scientific-Atlanta, always include the Scientific-Atlanta part number, the part description, the unit serial number, unit name, subassembly name, part manufacturer, and manufacturer's part number.

LOGIC MODULE

REF DESIG	DESCRIPTION	S-A PART NO.	FSCM	MFR PART NO.
IC NO'S 2,3,4, 23,24, 25,26, 29,30, 32,54	SW946-2P	76702	27318	SW946-2P
1,5,6, 7,11, 19,20, 21,22, 27,28	SW936-2P	79441	27318	SW936-2P
8	MC1806P	79741	80211	MC1806P
9,10, 14,15	1812	80512	80211	1812
13	MC1808	81027	80211	MC1808
16,17	SN74184	-----	01295	SN74184
18	SN7442	80010	01295	SN7442
31	SN74185	-----	01295	SN74185
12	SW962	76699	27318	SW962

PARTS LIST

POWER SUPPLY CHASSIS

REF DESIG	DESCRIPTION	S-A PART NO.	FSCM	MFR PART NO.
	±12V Power Supply 5V Regulator	46034	10110	
C1	4000 MFD 15V	70684	14655	
C2	.002 MFD Cer Disc.	70552	71590	
C3	500 MFD 50V	70678	80183	
CR1	1N816	71120	80368	
CR2	1N816	71120	8036	
CR3	1N821	71121	80211	
CR4	1N2484	71132	03877	
CR5	1N2484	71132	03877	
Q1	2N2270	73140	79089	
Q2	2N3251	77148	80211	
R1	1K 1/4W	71951	01121	
R2	82 1/2W	71880	01121	
R3	33 1/2W	71858	01121	
R4	10K 1/4W	72026	01121	
R5	3.3K 1W	71989	01121	
C1	.002 1K Cer Disc.	70552	71590	
CR1	1N1341 R	79760	80211	
CR2	1N1341 R	79760	80211	
CR3	1N3997 R	79440	80211	
Q1	2N3055	78017	13715	
T1	F203U	81074	81095	
T2	F93X	73094	81095	
ALL RESISTORS 1/4W, 10% UNLESS OTHERWISE NOTED				

READER LOGIC LEVEL CONVERTER

REF DESIG	DESCRIPTION	S-A PART NO.	FSCM	MFR PART NO.
C1	.01	70564	71590	
C2	.01	70564	71590	
CR1 thru CR10	1N4154	71142	80368	
Q1 thru Q10	2N3947	71147	80211	
Q11	2N3251	77148	80211	
R1	15K	72039	01121	
R2	3.3K	71989	01121	
R3	6.8K	72014	01121	
R4	2.2K	71977	01121	
R5	See R2			
R6	4.7K	72002	01121	
R7	47K	72077	01121	
R8	15K	72077	01121	
R9	See R2			

ALL RESISTORS 1/4W, 10% UNLESS OTHERWISE NOTED

PARTS LIST

READER LOGIC LEVEL MODULE

REF DESIG	DESCRIPTION	S-A PART NO.	FSCM	MFR PART NO.
R10	See R6			
R11	See R7			
R12	See R8			
R13	See R2			
R14	See R6			
R15	See R7			
R16	See R8			
R17	See R2			
R18	See R6			
R19	See R7			
R20	See R8			
R21	See R2			
R22	See R6			
R23	See R7			
R24	See R8			
R25	See R2			
R26	See R6			
R27	See R7			
R28	See R8			
R29	See R2			
R30	See R6			
R31	See R7			
R32	See R8			
R33	See R2			
R34	See R6			
R35	See R7			
R36	See R8			
R37	See R2			
R38	10K	72026	01121	
R39	1K	71951	01121	
R40	27K	72059	01121	

ALL RESISTORS 1/4W, 10% UNLESS OTHERWISE NOTED

RECORDER LOGIC LEVEL CONVERTER

REF DESIG	DESCRIPTION	S-A PART NO.	FSCM	MFR PART NO.
C1	.01µfd	70564	71590	
C2	.01µfd	70564	71590	
C3	3.9µfd	70622	80183	
C4	10 µfd	80039	None	
C5,C6	25 µfd	70651	80183	
CR1	1N4154	71142	80368	
CR2	1N4154	71142	80368	
CR3	1N4154	71142	80368	
CR4	1N4154	71142	80368	
CR5	1N4154	71142	80368	
Q1	2N3251	77148	80211	
Q2	2N3251	77148	80211	
Q3	2N3251	77148	80211	
Q4	2N3251	77148	80211	
Q5	2N3251	77148	80211	
Q6	2N3251	77148	80211	
Q7	2N3251	77148	80211	
Q8	2N3251	77148	80211	
Q9	2N3251	77148	80211	
Q10	2N3251	77148	80211	
Q11	2N3947	71147	80211	
Q12	2N3947	71147	80211	
Q13	2N3947	71147	80211	
Q14	2N3947	71147	80211	
Q15	2N3947	71147	80211	
Q16	2N2270	73140	79089	
Q17	2N3947	71147	80211	

PARTS LIST

RECORDER LOGIC LEVEL CONVERTER - continued

REF DESIG	DESCRIPTION	S-A PART NO.	FSCM	MFR PART NO.
R1	22K	72054	01121	
R2	4.7K	72002	01121	
R3	See R1			
R4	See R2			
R5	See R1			
R6	See R2			
R7	See R1			
R8	See R2			
R9	not assigned			
R10	See R1			
R11	See R2			
R12	See R1			
R13	See R2			
R14	See R1			
R15	See R2			
R16	See R1			
R17	See R2			
R18	See R1			
R19	See R2			
R20	See R1			
R21	10K	72026	01121	
R22	1K	71951	01121	
R23	3.3K	71989	01121	
R24	6.8K	72014	01121	
R25	1.5K	71966	01121	
R26	5.6K	72011	01121	
R27	See R26			
R28	See R26			
R29	See R26			
R30	See R26			
R31	See R26			

ALL RESISTORS 1/4W, 10% UNLESS OTHERWISE NOTED

RECORDER LOGIC LEVEL CONVERTER -continued

REF DESIG	DESCRIPTION	S-A PART NO.	FSCM	MFR PART NO.
R32	See R26			
R33	See R26			
R34	3.3K	71989	01121	
R35	See R34			
R36	See R34			
R37	See R34			
R38	See R34			
R39	See R34			
R40	See R34			
R41	See R34			
R42	See R1			
R43	See R34			
R44	8.2K	72019	01121	
R45	See R34			
R46	See R34			
R47	See R2			
R48	See R1			
R49	See R34			
R50	See R44			
R51	See R34			
R52	5K pot	77957	44655	
R53	See R52			
R54	See R26			
R55	See R34			
R56	See R24			
R57	10Ω	71836	01121	
R58	10Ω	71836	01121	
R59	100Ω, 1/2W	71889	01121	
R60				
ALL RESISTORS 1/4W, 10% UNLESS OTHERWISE NOTED				

I N D E N T E D E X P L O S I O N AS OF 04/11/72 PAGE 1

ASSEMBLY	DESCRIPTION	UTR	LT	UM	QTY	JOB
0046034	ASSEMBLY 15V POWER SUPPLY	14	07	EA	1	123

ITEM	COMPONENT	DESCRIPTION	UTR	LT	UM	QTY	JOB
	0039120	ASSEMBLY 15VCLT POWER SUPPLY	54C	07	EA	1	3610
1	0031890	BOARD PC &	12B	07	EA	1	123
2	0031891	BOARD PC -	12A	07	EA	1	123
3	0075221	CAPACITR 1100 MF 50V	11	04	EA	2	122
4	0070536	CAPACITR 390 PF 500V SILVER MICA 5%	P1	04	EA	2	122
5	0070552	CAPACITR .002 MF 1KV CER DISC	P1	04	EA	2	122
6	0070651	CAPACITR 25 MF 25V	P1	04	EA	2	122
7	0071124	DIODE 1N1220 SIL 200V 1.6A	11	04	EA	5	122
8	0071120	DIODE 1N816 SI REFERENCE STABISTOR	11	04	EA	7	122
9	0071121	DIODE 1N821 TC REF 6.2V .01% .4W	11	04	EA	1	122
10	0071111	DIODE 1N459A SIL 175V 40MA	P1	04	EA	2	122
11	0076316	TRANSSTR 2N4036 PNP SIL	11	04	EA	3	122
12	0073140	TRANSSTR 2N2270 NPN SIL	11	04	EA	3	122
15	0072028	RESISTOR 10K OHM 1/2W 10% COMP	11	04	EA	2	519
16	0071954	RESISTOR 1.0K OHM 1/2W 10% COMP	11	04	EA	2	519
17	0071902	RESISTOR 180 OHM 1/2W 10% COMP	11	04	EA	2	519
18	0071889	RESISTOR 100 OHM 1/2W 10% COMP	11	04	EA	1	519
19	0071978	RESISTOR 2.2K OHM 1/2W 10% COMP	11	04	EA	2	519
20	0072020	RESISTOR 8.2K OHM 1/2W 10% COMP	11	04	EA	1	519
21	0072040	RESISTOR 15K OHM 1/2W 10% COMP	11	04	EA	1	519
22	0071817	RESISTOR 1.2 OHM 3W	11	03	EA	2	122
23	0071936	RESISTOR 600 OHM 3W	11	03	EA	1	122
24	0071963	RESISTOR 1.2K OHM 3W	11	03	EA	2	122
25	0071922	RESISTOR 400 OHM 3W	P1	03	EA	1	122
26	0072309	SCREW 4-40 X 3/16 PAN HD,SST	P1	04	EA	8	519
27	0072880	STANDOFF 6-32/1 END 2 7/8 LG 1/4 SQ	11	04	EA	2	122
28	0073017	TERMINAL SOLDER TURRET STAKE STD	11	04	EA	26	519
29	0073265	WASHER NO. 4 LOCK, EXT TOOTH, AUS SST	11	04	EA	8	519
30	0076301	STRAP TIE DOWN RUBBER ROUND 1/8 DIA	11	04	EA	4	519
31	0080851	TUBING HEAT SHRINKABLE 3/8 OD CLEAR	11	04	FT	0*	122
	0046689	CHASSIS 15V POWER SUPPLY	12	07	EA	1	123
	0071359	JACK, TIP, NYLON, RED	11	04	EA	1	122
	0071362	JACK, TIP, NYLON, VIOLET	11	04	EA	1	122
	0071692	POT 250 OHM 2W COMP PNL MT LOCKING	11	04	EA	2	122
	0073096	XFMR SEC VOLTAGES FROM 8 TO 45 V AT .4A	11	04	EA	1	122
	0073133	TRANSSTR 2N1501 PNP GER	11	04	EA	2	122
H	0071291	GROMMET 1/2 PANEL HOLE 3/8 ID	11	04	EA	2	519
HH	0071499	NUT FLEXLOC 6-32 THIN HEX CAD PL STL	P1	04	EA	4	519
HH	0072363	SCREW 6-32 X 3/8 PAN HD,SST	P1	04	EA	2	519
HH	0073269	WASHER NO. 6 LOCK, EXT TOOTH, AUS SST	11	04	EA	2	519
HH	0073276	WASHER NO. 10 FLAT, GEN PURP, CAD PLT	11	04	EA	1	519
H	0075244	CLAMP CABLE FOR 1/4 DIA CABLE NYLON	11	04	EA	1	519

PARTS LIST

DECODER SUBASSEMBLY

REF DESIG	DESCRIPTION	S-A PART NO.	FSCM	MFR PART NO.
	CAPACITORS			
C1 thru C6	Cer disc. .002 F, 1 kV	70552	71590	DD202
	DIODES			
CR1	Si, 1A 600V, 1N2484	71132	84970	1N2484
CR2	Ge, 75 mA 100V, 1N277	71110	80368	1N277
CR3	Si, Zener 3.0-3.9V .25W, 1N703	1116		
CR4	See CR1			
CR5	See CR2			
CR6	See CR3			
CR7	See CR1			
CR8	See CR2			
CR9	See CR3			
CR10	See CR1			
CR11	See CR2			
CR12	See CR3			
CR13	See CR1			
CR14	See CR2			
CR15	See CR3			
CR16	See CR1			
CR17	See CR2			
CR18	See CR3			
CR19	See CR2			
CR20	See CR3			
CR21	See CR2			
CR22	See CR3			

PARTS LIST

DECODER SUBASSEMBLY - continued

REF DESIG	DESCRIPTION	S-A PART NO.	FSCM	MFR PART NO.
	RESISTORS (Fixed unless O/S			
R1	Comp, 22K ±10%, 1/4W	72054	01121	
R2	Comp, 4.7K ±10%, 1/4W	72002	01121	
R3	Comp, 33K ±10%, 1/4W	72064	01121	
R4	Comp, 3.9K ±10%, 1/4W	71993	01121	
R5	Comp, 8.2K ±10%, 1/4W	72019	01121	
R6	Comp, 820 ±10%, 1/2W	71942	01121	
R7	See R4			
R8	See R1			
R9	See R2			
R10	See R3			
R11	See R5			
R12	See R6			
R13	See R4			
R14	See R1			
R15	See R3			
R16	See R5			
R17	See R6			
R18	See R1			
R19	See R4			
R20	See R2			
R21	See R6			
R22	See R3			
R23	See R5			
R24	See R1			
R25	See R2			
R26	See R3			
R27	See R5			
R28	See R6			
R29	See R4			

PARTS LIST

DECODER SUBASSEMBLY - continued

REF DESIG	DESCRIPTION	S-A PART NO.	FSCM	MFR PART NO.
	RESISTORS--continued			
R30	See R1			
R31	See R2			
R32	See R4			
R33	See R3			
R34	See R5			
R35	See R6			
R36	See R2			
R37	See R1			
R38	See R4			
R39	See R3			
R40	See R5			
R41	See R6			
R42	See R2			
R43	See R1			
R44	See R4			
R45	See R3			
R46	See R5			
R47	See R6			
R48	See R2			
R49	Comp, 1K 10%, 1W	71955	01121	
	TRANSISTORS			
Q1	Ge, PNP, 2N1183A	73130		
Q2	Ge, PNP, 2N404A	73123		
Q3	See Q1			
Q4	See Q2			
Q5	See Q1			
Q6	See Q2			
Q7	See Q1			

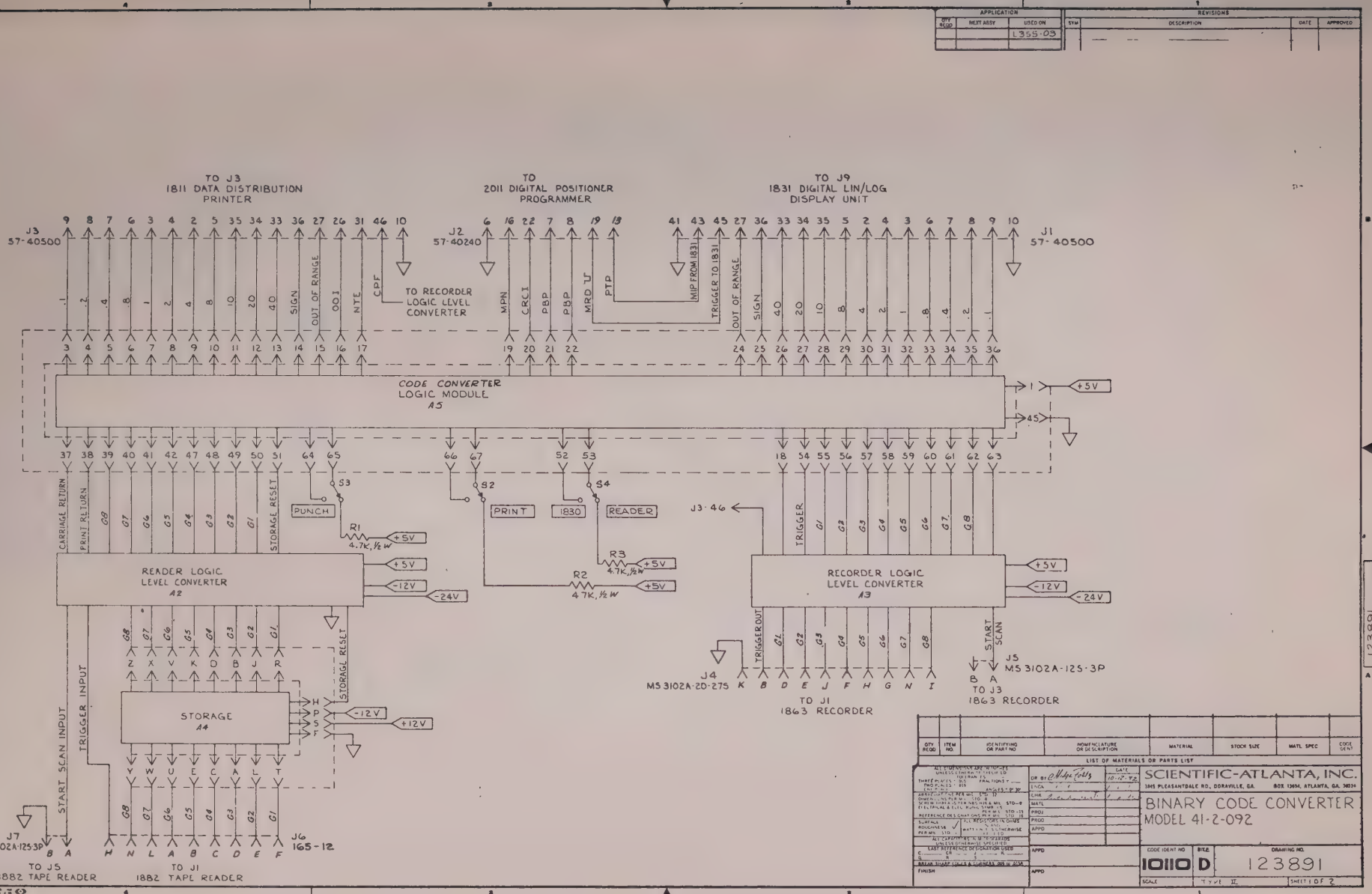
PARTS LIST

DECODER SUBASSEMBLY - continued

REF DESIG	DESCRIPTION	S-A PART NO.	FSCM	MFR PART NO.
	TRANSISTORS--continued			
Q8	See Q2			
Q9	See Q1			
Q10	See Q2			
Q11	See Q1			
Q12	See Q2			
Q13	See Q1			
Q14	See Q2			
Q15	See Q1			

L355

CHAPTER 7
DIAGRAMS



APPLICATION			REVISIONS			
QTY REQD	NEXT ASSY	USED ON	SYM	DESCRIPTION	DATE	APPROVED
		L355-03				

QTY REQD	ITEM NO.	IDENTIFYING OR PART NO	NOMENCLATURE OR DESCRIPTION	MATERIAL	STOCK SIZE	MATL SPEC	CODE IDENT

LIST OF MATERIALS OR PARTS LIST

ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED
THREE PLACE DECIMALS ± .005
TWO PLACE DECIMALS ± .015
FRACTIONS ± 1/64
ANGLES ± 30'
ABRASIVE FINISH MIL STD 10
DIMENSIONS PRIOR TO STD 10
SCREW THREADS PER MIL STD 8
FILLETS, RADII & ELEL RUNS PER MIL STD 13
REFERENCE DIMENSIONS PER MIL STD 14
SURFACE ROUGHNESS ✓ PER MIL STD 10 AND MIL STD 15 OTHERWISE
PERMIS. STD
ALL CASTINGS SHALL BE OF GOOD COMMERCIAL QUALITY UNLESS OTHERWISE SPECIFIED
LAST DIFFERENCE OF DEVIATION USED
C ——— R ———
G ——— T ———
BREAK SHARP EDGES & CORNERS .005 IN RAD
FINISH

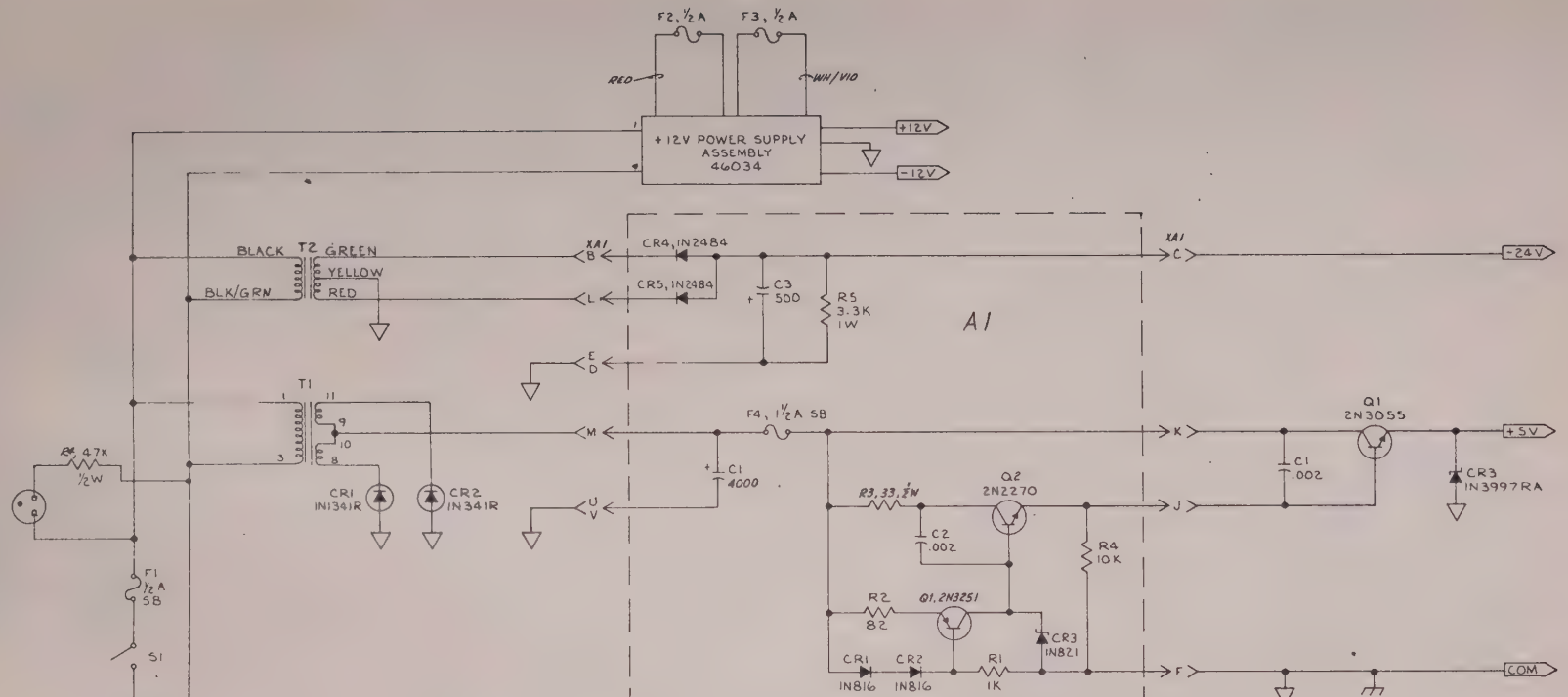
DR BY Mike Folds DATE 10-12-72
ENGR
CHK
MATL
PROJ
PROD
APPD
APPD
APPD

SCIENTIFIC-ATLANTA, INC.
1845 PEACHTREE RD., DORAVILLE, GA. BOX 13654, ATLANTA, GA. 30324

BINARY CODE CONVERTER
MODEL 41-2-092

CODE IDENT NO	SIZE	DRAWING NO.
10110	D	123891
SCALE	TYPE II	SHEET 1 OF 2

123891



APPLICATION			REVISIONS			
QTY REQD	NEXT ASSY	USED ON	SYM	DESCRIPTION	DATE	APPROVED
		L355-03				

QTY REQD	ITEM NO	IDENTIFYING OR PART NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL	STOCK SIZE	MATL SPEC	CODE IDENT

LIST OF MATERIALS OR PARTS LIST

ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED
TOLERANCES: THREE PLACE DEC ±.005 TWO PLACE DEC ±.01 FRACTIONS ± 1/64 ANGLES ± 0° 30'
BREAK ALL SHARP EDGES .005 MAX UNLESS OTHERWISE SPECIFIED
DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982
REFERENCE DESIGNATIONS PER ANSI Y32.16, 1975
SURFACE ROUGHNESS PER MIL-STD-10 ✓ MAX
ALL APPLICABLE EDGES TO BE FREE OF BURRS AND SHARP CORNERS
MATERIAL AND FINISH PER MIL-STD-100
FINISH

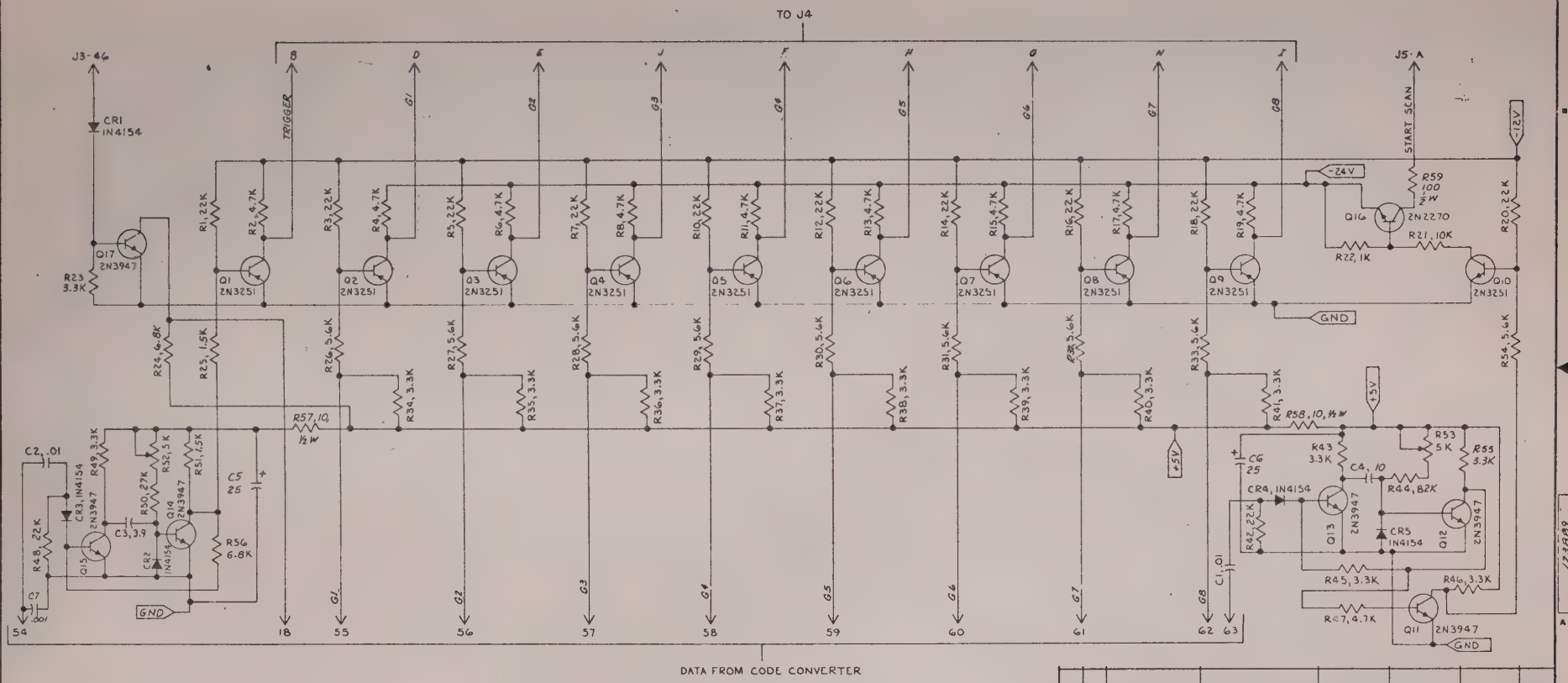
DR BY C. Mahaffey DATE 11-17-76
ENGR
CHK
MATL
PROJ
PROD
APPD
APPD
APPD

SCIENTIFIC-ATLANTA, INC.
3845 PLEASANTDALE RD., DORAVILLE, GA. BOX 13684, ATLANTA, GA. 30324

BINARY CODE CONVERTER
MODEL 41-2-092

CAGE IDENT NO	SIZE	DRAWING NO
10110	D	123891
SCALE	TYPE 2	SHEET 2 OF 2

123891



APPLICATION		
QTY REQD	NEXT ASSY	USED ON
		L855-03

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED

QTY REQD	ITEM NO	IDENTIFYING OR PART NO	NOMENCLATURE OR DESCRIPTION	MATERIAL	STOCK SIZE	MATL SPEC	CODE IDENT

LIST OF MATERIALS OR PARTS LIST

ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED
THREE PLACES TOLERANCES FRACTIONS ±
TWO PLACES ±
ONE PLACE ±
ANGLES ±
ABRASIVE FINISH PER MIL STD
BURR REMOVAL PER MIL STD
ELECTRICAL & ELECTRONIC PER MIL STD
REFERENCE DESIGNATIONS PER MIL STD
SURFACE ROUGHNESS ALL MACHINED SURFACES
PERMA STD
MATERIAL SPEC
DO NOT SCALE THIS DRAWING
LAST ASSY/REVISE DESIGNATIONS
FROM
TO
BREAK SHARP EDGES & CORNERS .005 R ELSE
FINISH

DR BY TJ Gwinnett DATE 10.22.76
ENGR
CHK
MATL
PROJ
PROD
APPD
APPD
APPD

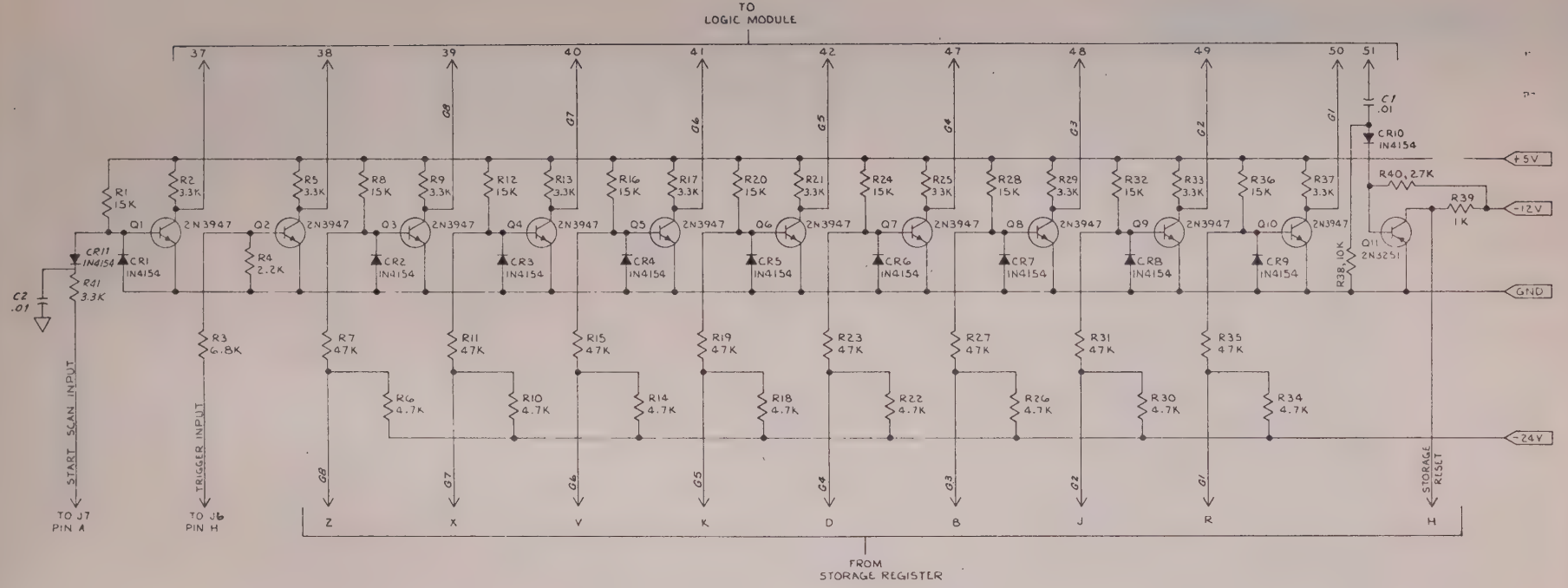
SCIENTIFIC-ATLANTA, INC.
3845 PLEASANTDALE RD., DORAVILLE, GA. BOX 13654, ATLANTA, GA. 30324

RECORDER LOGIC LEVEL CONVERTER

ISSUE	SIZE	DRAWING NO
10110	D	123889

SCALE SHEET

123889



APPLICATION			REVISIONS			
QTY REQD	NEXT ASSY	USED ON	SYM	DESCRIPTION	DATE	APPROVED
		2355-03				

QTY REQD	ITEM NO	IDENTIFYING OR PART NO	NOMENCLATURE OR DESCRIPTION	MATERIAL	STOCK SIZE	MATL SPEC	COMMENT

LIST OF MATERIALS OR PARTS LIST

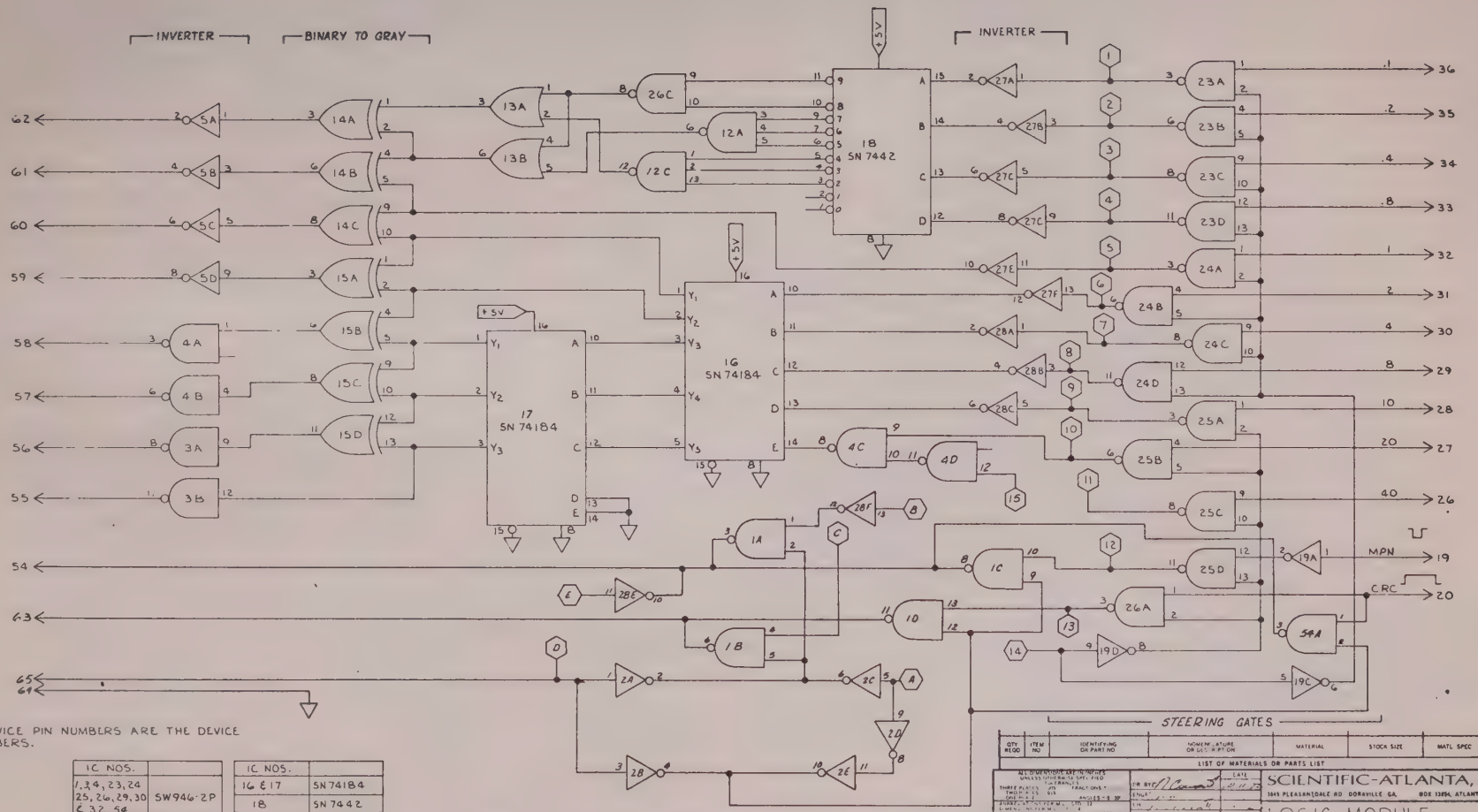
DR BY T.J. Conant 10-11-72
CHK
MATL
PROJ
PD
APPD
APPD
APPD

SCIENTIFIC-ATLANTA, INC.
3845 PLEASANTDALE RD., DORAVILLE, GA. BOX 13654, ATLANTA, GA. 30324

READER LOGIC LEVEL CONVERTER

SIZE 10110 D
DRAWING NO 123890
SCALE
SHEET

123890



NOTE:

1- LOGIC DEVICE PIN NUMBERS ARE THE DEVICE PIN NUMBERS.

IC NOS.	
1,3,4,23,24 25,26,29,30 & 32,5#	SW946-2P
25,6,7,11,19,20 21,22,27 & 28	SW936-2P
8	1806
9,10,14 & 15	1812
13	1808

IC NOS.	
16 & 17	SN 74184
18	SN 7442
31	SN 74185
12	SW 962
	NOT ASSIGNED

APPLICATION			REVISIONS			
QTY REQD	NEXT ASSY	USED ON	SYM	DESCRIPTION	DATE	APPROVED
		L855-03				

QTY REQD	ITEM NO	IDENTIFYING OR PART NO	NOMENCLATURE OR DESCRIPTION	MATERIAL	STOCK SIZE	MATL SPEC	CODE IDENT

LIST OF MATERIALS OR PARTS LIST

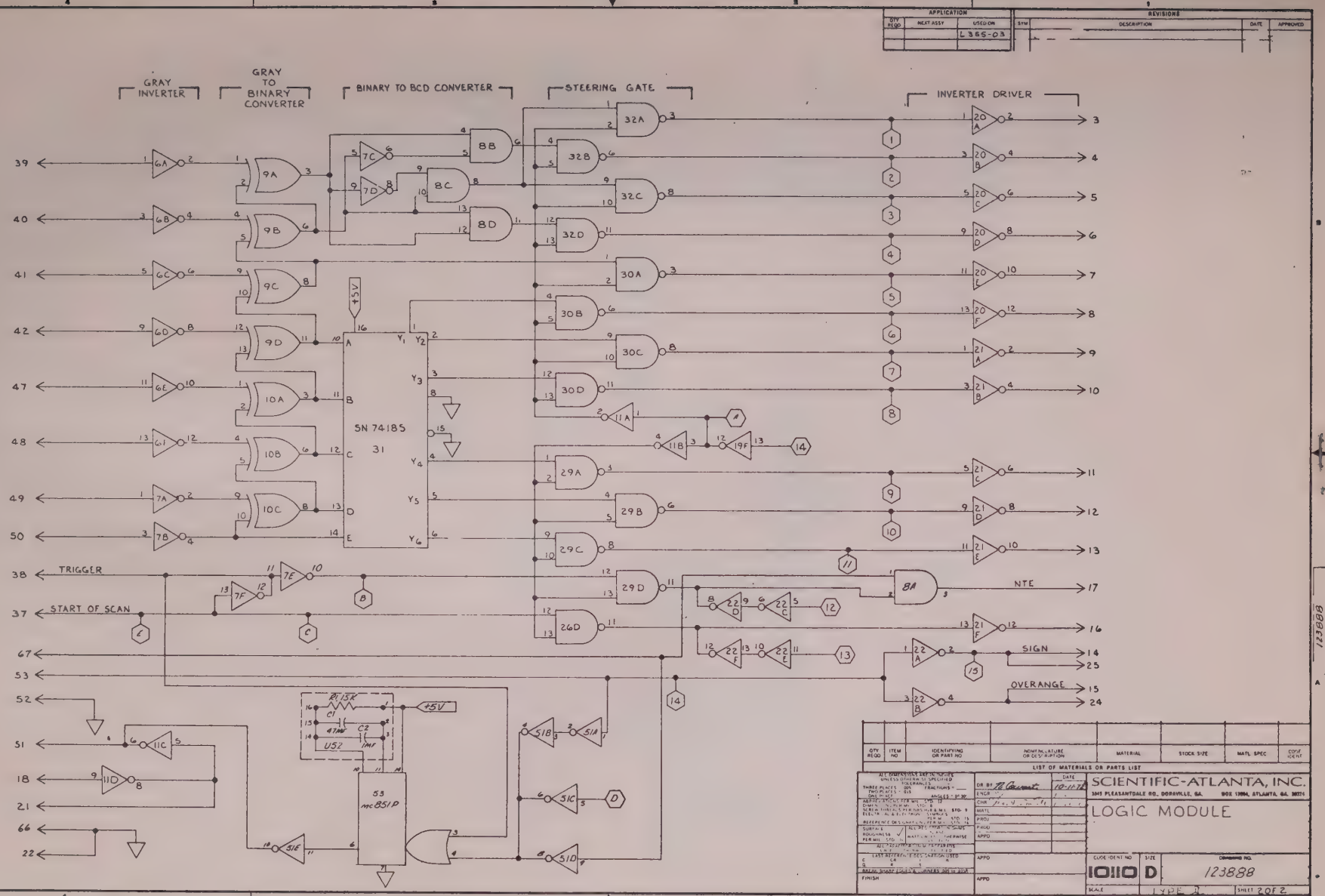
SCIENTIFIC-ATLANTA, INC.
3845 PLEASANTDALE RD DORAVILLE GA. BOX 13254, ATLANTA, GA. 30324

LOGIC MODULE

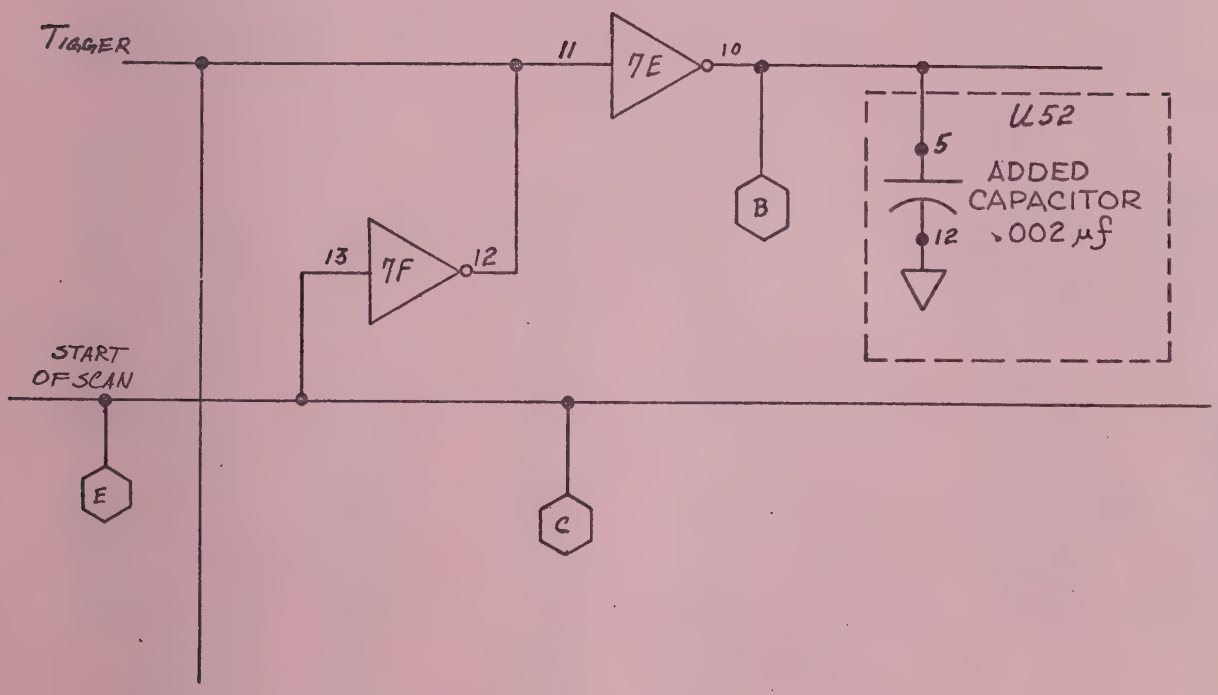
CODE IDENT NO	SIZE	DRAWING NO
10110	D	123888

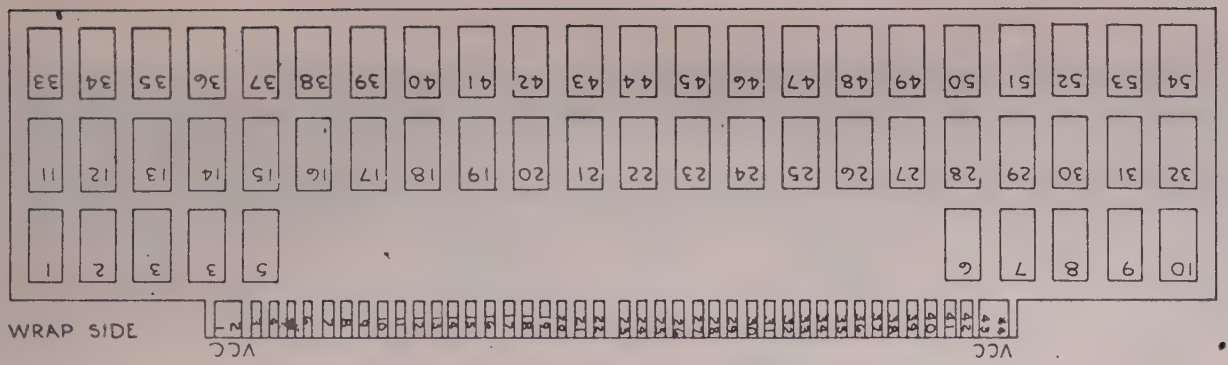
SCALE | TYPE B | SHEET 1 OF 2

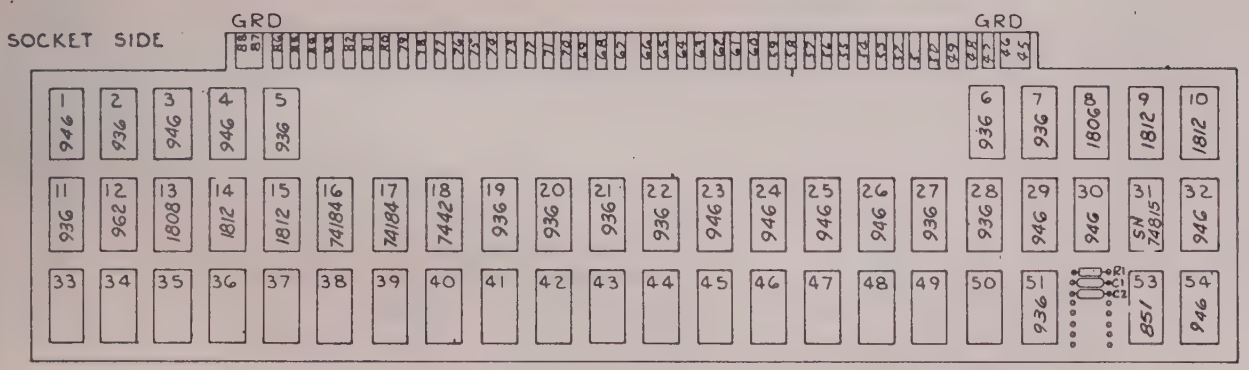
123888


GRAY INVERTER
GRAY TO BINARY CONVERTER
BINARY TO BCD CONVERTER
STEERING GATE
INVERTER DRIVER
SN 74185
31
+5V
TRIGGER
START OF SCAN
NTE
SIGN
OVERANGE
LOGIC MODULE
SCIENTIFIC-ATLANTA, INC.
123888

CHANGE TO DRAWING NO. 123888 - Sheet 2







ITEM OR FIND NO.	QTY REQD	S-A STOCK NO.	NOMENCLATURE OR DESCRIPTION	MATL SPEC AND SIZE OR COMPONENT VALUE	IDENTIFYING OR PART NO.	CODE IDENT.

PARTS LIST

UNLESS OTHERWISE SPECIFIED: ALL CAPACITORS ARE IN MICRO-FARADS AND ALL RESISTORS ARE IN OHMS, ± 10% AND 1/4 WATT.

LAST REFERENCE DESIGNATION USED

C	CR	J	K
Q	R	S	U

INTERPRET THIS DRAWING PER SCIENTIFIC-ATLANTA, INC. SPECIFICATIONS AND STANDARDS MANUAL

ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED

TOLERANCES
3 PLACE DECIMALS ± .005
2 PLACE DECIMALS ± .02
1 PLACE DECIMAL ± .1

FRACTIONS ± ANGLES 0° 30'

MAX SURFACE ROUGHNESS 125 ALL MACHINED SURFACES EXCEPT AS NOTED

BREAK SHARP EDGES AND CORNERS .010 MAX

FINISH

CONTRACT NO.

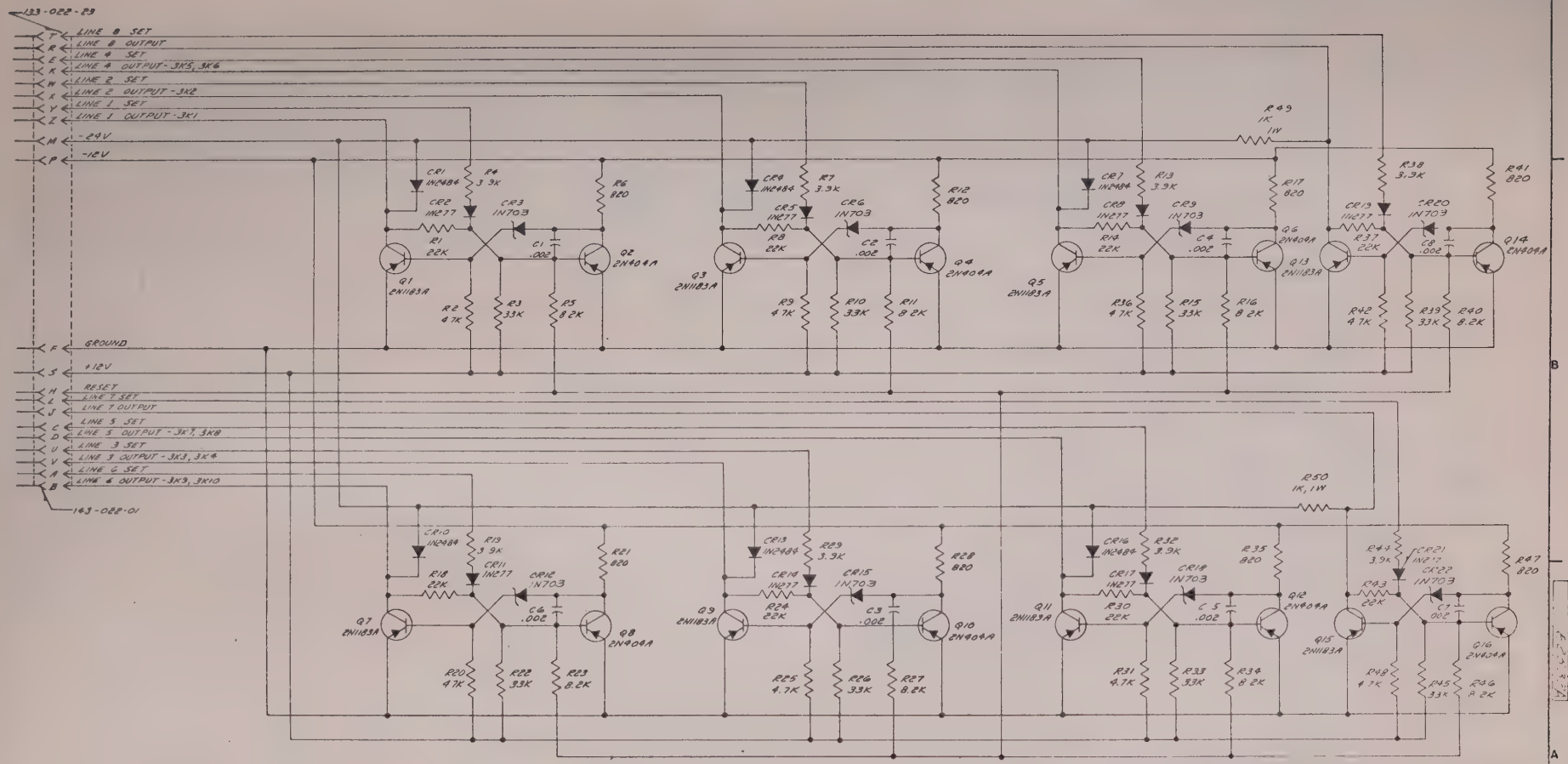
DWN	M. Cowart	10-10-72
ENGR	BJ	10-27-72
CHK	Martin Sullivan	10-23-72
PROD		
APVD		
APVD		

SCIENTIFIC-ATLANTA, INC.
3845 PLEASANTDALE RD., DORAVILLE, GA. 30340 BOX 13654, ATLANTA, GA. 30324

WIRE WRAP CARD-ASSEMBLY
LOGIC MODULE

SIZE	CODE IDENT NO.	DRAWING NO.
C	10110	123874

SCALE NONE SHEET



Resistors 49 and 50
have been deleted.

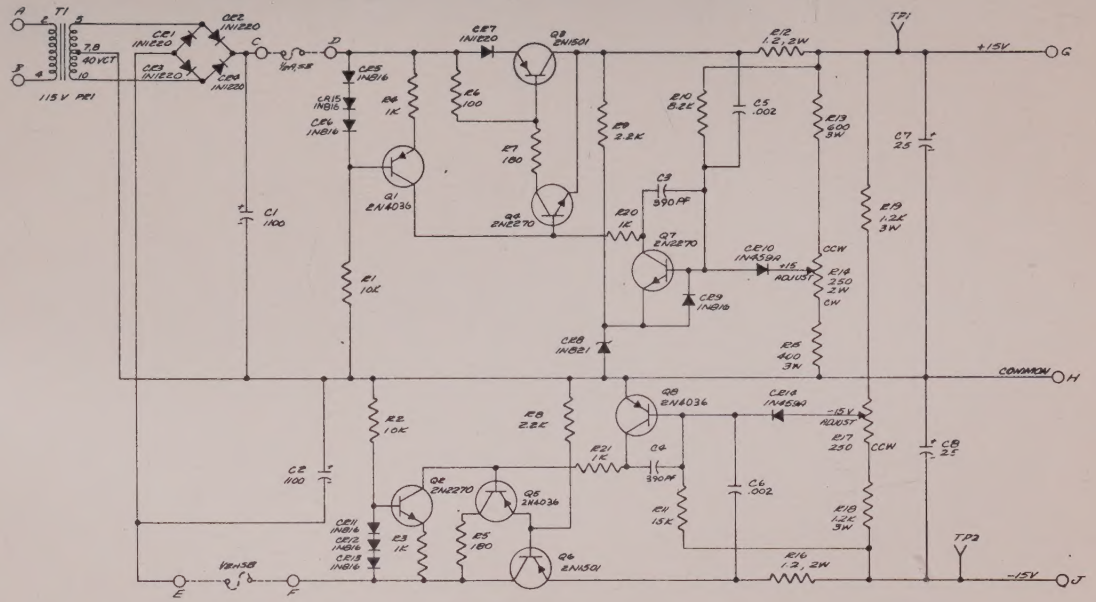
SCIENTIFIC-ATLANTA, INC.

RADIATION DISTRIBUTION
PRINTER, PLUG-IN CARD 3A2
MODEL 1803

10110 D 1803-1E2532A

APPLICATION		
QTY REQD	NEXT ASSY	USED ON
		STD

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
A	REFERENCE DCN		
B	SEE DCN 42 Current + 24V		



QTY REQD	ITEM NO	IDENTIFYING OR PART NO	NOMENCLATURE OR DESCRIPTION	MATERIAL	STOCK SIZE	MATL SPEC	CODE IDENT
LIST OF MATERIALS OR PARTS LIST							

ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED
TOLERANCE UNLESS OTHERWISE SPECIFIED
THREE PLACES - DECIMALS ± .005
TWO PLACES - DECIMALS ± .01
ONE PLACE - DECIMALS ± .1
ANGLES ± 0° 30'
ABBREVIATIONS PER MIL - STD - 12
DIMENSIONS PER MIL - STD - 8
SCREW THREADS PER MIL-STD-8 & MIL - STD - 9
ELECTRICAL & ELECTRONIC SYMBOLS PER MIL - STD - 15
REFERENCE DESIGNATIONS PER MIL - STD - 16
SURFACE ROUGHNESS PER MIL - STD - 10 ✓ ALL MACHINED SURFACES 125 RMS 1/4 WATT UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS IN PARENTHESES ARE REFERENCE ONLY UNLESS OTHERWISE SPECIFIED
LAST REFERENCE OF DESIGNATION USED: S CR L; A C; B
BREAK SHARP EDGES & CORNERS .005 TO .015
FINISH

DR BY C. Heckmann 6/10/66
ENGR
CHK
MATL
PROJ
PROD
APPD
APPD
APPD

SCIENTIFIC-ATLANTA, INC.
3845 PLEASANTDALE RD., DORAVILLE, GA. BOX 13654, ATLANTA, GA. 30324

SCHEMATIC DIAGRAM
±15 VOLT MODULAR
POWER SUPPLY

CODE IDENT NO. 10110 | SIZE D | DRAWING NO. 33087E
SCALE | SHEET

33087-1



MP MASTER
MA29829